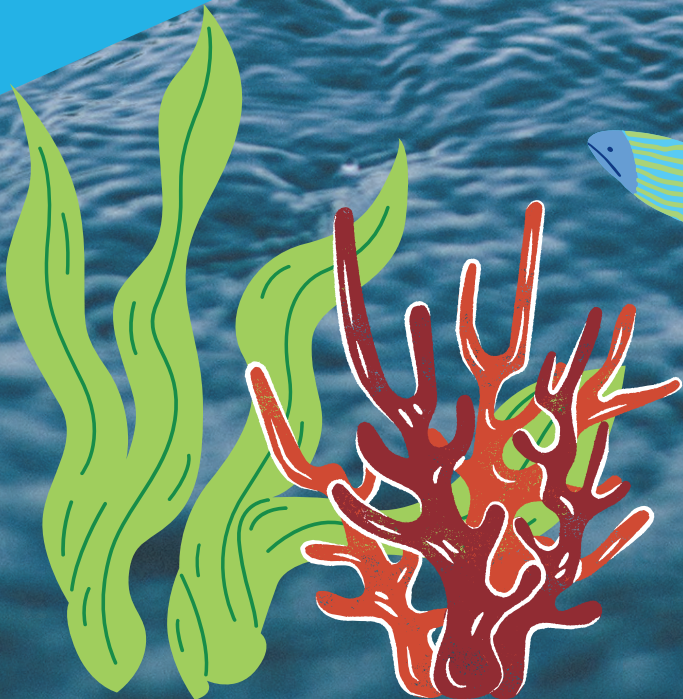
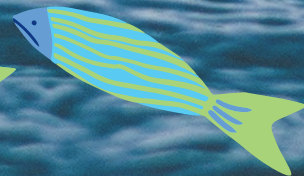
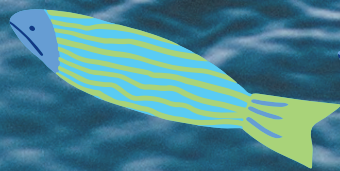
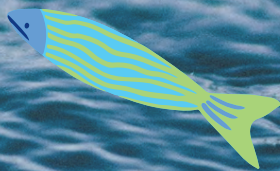


Marine Education Educator Guidebook Grades 4-6



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Acknowledgements

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Curriculum collaboratively developed by Perennia Food & Agriculture Corp. and Sea Change CoLab.



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Land Acknowledgement

Before we begin it is important to acknowledge that we are in the ancestral and unceded territory of the Mi'kmaq People. This territory is covered by the "Treaties of Peace and Friendship" which Mi'kmaq, Wəlastəkwewiyik (Maliseet), and Passamaquoddy Peoples first signed with the British Crown in 1726. We are all Treaty People.



African Nova Scotian Acknowledgement



It is also important to acknowledge that people of African descent have been in Nova Scotia for over 400 years, and we honour and offer gratitude to those ancestors of African descent who came before us to this land.

Background



Goals of the Marine Education curriculum supplement:

- Raise awareness of Nova Scotia's marine and coastal ecosystems, effective coastal management, and the stewardship role of citizens;
- Establish the historical and future significance of marine and fisheries-based development to the social and economic prosperity of the province, communities, families and individual children or youth;
- Demonstrate the prevalence of social responsibility and science-based decision making in the management of Nova Scotia's coastal ecosystems and its fisheries;
- Communicate the diversity and quality of marine and fisheries-related careers, offering an alternative to any presenting biases about those careers;
- Generate curiosity and increased consideration of marine and fisheries-related careers to increase workforce supply, particularly in the fisheries-related sectors; and
- Prioritize the the lobster industry, as Nova Scotia's most economically important fishery.

Note to Educators

Each lesson follows the same format throughout the guidebook with critical questions and reflections built into the activities section.

The guide follows the overarching theme of interconnectedness, integrating scientific, conservation, and Indigenous knowledge. The thought book section prompts students to reflect, and consider what they have learned through drawing and/or writing.

The activities start with inquiry-based questions, to create curiosity, and explore what students already know and feel about the lesson topics. This could be done in small groups, or as a large group, through discussion, writing, visuals and graphic organizers, etc.

This guide includes curriculum links, a general glossary, as well as a glossary and background information specific to each lesson.

Any text in green is a hyperlink to a video, website, or resource.

There is an accompanying student workbook, with shortened lesson titles, activities, and resources.

Key Messages:

Marine and fisheries-related sectors' practices are among the most sustainable in the world

Fisheries are vital to Nova Scotia's future social and economic prosperity

The careers are modern, well-paying, and available in many communities in NS

There are many different and exciting career options in the marine and fisheries sectors

The fisheries sector has a role to play in addressing global challenges related to oceans and food security

Curriculum Links: 4-6

Social Studies

4

- investigate the relationships between humans and the physical environment.

5

- investigate how we learn about the past, with a focus on AAGM+.
- investigate how environment influenced the development of an ancient society.

6

- investigate the role of culture in communities, inclusive of AAGM+.
- analyze the impact of cross-cultural understanding, inclusive of AAGM+.
- compare sustainability practices between Canada and a selected country.
- analyze how traditions and beliefs relate to culture in a region.
- implement age-appropriate actions that demonstrate responsibility as global citizens.

Science

- investigate a variety of local natural habitats.
- analyze interconnectiveness of and within local habitats, inclusive of a Mi'kmaw perspective.
- investigate weather.
- investigate how weather impacts daily life.
- analyze diversity of life in nature and significant relationships within the natural world.

Glossary

Source: Merriam Website Dictionary, unless otherwise indicated

AAGM+: Acadians, African Nova Scotians, Gaels, Mi'kmaq, and various cultural groups in Nova Scotia.

Carbon footprint: the amount of carbon dioxide, or greenhouse gases, produced as a result of our daily living.

Climate Change: refers to long-term shifts in temperatures and weather patterns. Increasing greenhouse gases warm our planet, and carbon emissions are changing rain and snow patterns, increasing the risk of intense storms and droughts.

Conservation: a careful preservation and protection of something, including planned management of a natural resource to prevent exploitation, destruction, or neglect.

Consumer: a person who buys goods or services for their own use.

Crustacean: any of various types of animals that live in water and have a hard outer shell and many legs: Crabs, lobsters, and shrimps are crustaceans. (Cambridge Dictionary)

Ecosystem: An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life. (National Geographic)

Etuaptmuk: (pronounced Ed-do-up-dim-moomk is Mi'kmaw for Two-Eyed Seeing) is a framework for bringing knowledge systems together grounded in Mi'kmaw understandings of the gift of multiple perspectives. Mi'kmaq Elder Albert Marshall describes Etuaptmuk as a process through which the strengths of Indigenous knowledges are seen through one eye, and the strengths of Western knowledges through the other, so that both distinct eyes may be used together for the benefit of all. (Bartlett, Marshall, and Marshall, 2012)

Exoskeleton: is an external skeleton that supports and protects an animal's body, in contrast to an internal skeleton.

Food, Social and Ceremonial fishery: fish can be caught and must be consumed by the individual Mi'kmaw person or community, can be used for the purpose of harvesting other species of food and is not to be sold.

Glossary

Global warming: the long-term trend of rising average global temperatures.

Indigenous knowledge: There is no single definition of Indigenous knowledge. For our purposes, we understand "Indigenous knowledge" as a term that refers to a set of complex knowledge systems based on the worldviews of Indigenous Peoples. Indigenous knowledge reflects the unique cultures, languages, values, histories, governance, and legal systems of Indigenous Peoples. (www.canada.ca)

Jakej: (pronounced ja-gej) Mi'kmaw word for lobster.

Livelihood: the way someone earns the money needed to pay for food, a place to live, and clothing.

Lobster fishing area (LFA): How the Atlantic Lobster fishing grounds are divided by the DFO. Each area can have specific lobster conservation measures and different seasons, and trap limits etc.

Molt: (of an animal) shed old feathers, hair, skin, or an old shell, to make way for a new growth. (Oxford dictionary)

Netukulimk: (pronounced neh-doo-goo-limbk) is the use of the natural bounty provided by the Creator for the self-support and well-being of the individual and the community. Netukulimk is achieving adequate standards of community nutrition and economic well-being without jeopardizing the integrity, diversity, or productivity of the environment. (Source: Unama'ki Institute of Natural Resources)

Reciprocity: mutual dependence, action, or influence.

Setting day: is the day all the lobster boats in the eligible lobster fishing areas are permitted to head out and set their traps in the water. Each boat is permitted to set a certain number of traps.

Stewardship: the careful and responsible management of something entrusted to one's care.

Wskitqamu: (pronounced sit-kah-moog) is Mi'kmaw for Mother Earth.

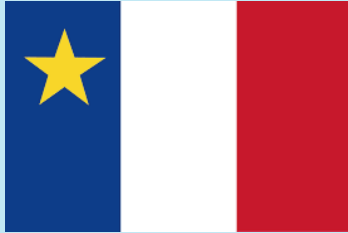
Lesson 1

Interconnectiveness: People, The Ocean, and Lobsters



Background

Acadian flag



The tricolour Acadian flag was chosen as the symbol of the Acadians in 1884, during the second Acadian National Convention in Miscouche, on Prince Edward Island. The design and colour scheme were inspired by the flag of France, the Acadians' ancestral country of origin. The gold star in the upper left corner represents Mary, the Virgin Mother who guided the outcast Acadians.

Nova Scotia is highly dependent on the oceans for our economic and social well-being. The ocean and marine life have been integral to people living in harmony in Mi'kma'ki (traditional Mi'kmaw territory that includes Atlantic provinces and parts of Québec and Maine).

Lobsters have been around for over 480 million years and have supported people and communities to live and thrive here. They are integral to sustaining and supporting social, economic, and cultural vibrancy in Nova Scotia.

Acadians, Gaels, African Nova Scotians, and Mi'kmaw people have long histories and storied connections to the Atlantic Ocean. Today, seafood is the province's most valuable export, much of it coming from the four major Acadian fishing areas. Seafood is also used for food, social events, and ceremonies.

Acadians- Acadians have a long history in Nova Scotia that began more than 400 years ago with the arrival of the first European settlers. In 1605, they established a settlement at Port Royal, in what would become known as Acadie. By the early 1700s, the colony's population grew to several thousands. Acadie encompassed fishing villages along the southern coast of Nova Scotia and farming communities to the north, stretching from Grand-Pré to Amherst and into New Brunswick. A distinct identity and culture emerged.

The sea shaped much of Acadian history, in both commerce and culture. Acadians created beautiful songs of the sea, including the famous "Partons la mer est belle". Their flag bears the "Star of the Sea" (Stella Mans) to guide them through storms and hardships. Today that tradition continues; Acadians play a vigorous part in fishing, processing, management, and every aspect of the Nova Scotia fishery.

Source: Department of Fisheries and Oceans, (2004). [The Acadian Fishery in Nova Scotia](#).

Background

African Nova Scotians- The history and culture the history of Black people in Nova Scotia goes back to the 16th century, well over 400 years ago with four major migrations that include the Black Loyalists, Jamaican Maroons, migrants of the war of 1812, and the later Caribbean migration. Those migrations created 52 historic communities that have called Nova Scotia home. People of African descent have contributed greatly to all aspects of Nova Scotia's community and society, particularly in the marine industry as fishers and processors, shippers, sailors, shipbuilders, and navigators.

There were enslaved Africans working in Louisburg's 18th century fishing stations. Black Loyalists turned to the sea for survival when left with few resources, and whole communities have both geographically and economically centered around the sea. Yet, the experiences and contributions of African Nova Scotian seafarers, and their coastal communities, have remained absent from most research regarding Nova Scotia's maritime industry.

Source: Black Cultural Centre of Nova Scotia, (2022). [African Nova Scotian Seafaring Announcement](#).

Gaels of Nova Scotia- Nova Scotia Gaels are descendants of the Gaels of Scotland. They also have connections to Irish Gaels through language, culture, and origins. An estimated 50,000 Gaels immigrated to Nova Scotia from the Highlands and Islands of Scotland between 1773 and 1855. By the late 1800s, there were about 100,000 Gaelic speakers in Nova Scotia. One third of Nova Scotians have Gaelic heritage. Gaelic language, music, and oral traditions permeate Nova Scotia's culture. This has had a significant effect on the province's society and economy. Generations of Nova Scotia Gaels farmed, raised animals, fished, made textiles, took up trades, worked in the woods, and mined. This was how many made their living, supported their families, and contributed to building local communities.

In 2008, the symbol of the Gaels in Nova Scotia was developed. The symbol is that of a salmon in the shape of the letter 'G'. The salmon represents the gifts of knowledge and wisdom in the Gaelic tradition in Nova Scotia, Scotland, Ireland, and on the Isle of Man. The 'G' represents Gaels as a people, and how their unique Gaelic language informs their culture, and identity.

Source: Government of Nova Scotia (2019). [Gaelic Nova Scotia: A Resource Guide](#).

African Nova Scotian flag



Red represents blood and sacrifice. Gold conveys cultural richness. Green symbolizes fertility and growth. Black stands for the people. The Sankofa symbol in the middle represents the importance of reaching back to the knowledge of the past and bringing it into the present.

Gaelic symbol



The Gaelic symbol is a salmon in the shape of the letter G. The salmon is for the gift of knowledge in the Gaelic traditions of Nova Scotia, Scotland, Ireland and the Isle of Man. The G is for the Gaelic language.



Background

Mi'kmaq- Mi'kma'ki is a vast area. Its diverse landscapes, seascapes, rivers, plants, animals, fish, rocks, and islands are inseparable from Mi'kmaw people, language, stories, history and spirit. For more than 13,500 years the ancestors of the Mi'kmaq and other Lnu'k (native people) have lived in Mi'kma'ki. Netukulimk is a Mi'kmaw concept which governs the physical, emotional, cognitive, social, and spiritual relationships a person has with everything. This includes the physical features of the land and oceans, and the rhythms and cycles and patterns of Wskitqamu (Mother Earth), and all her living beings and nonliving things. It is a profound way of “being and knowing” that guides one’s understandings of how to live within Wskitqamu and how to live in harmony.

The Mi'kmaq of Nova Scotia have been engaged in a Rights Implementation process with the Federal Government for a number of years. One of the key areas in the implementation of Aboriginal and Treaty Rights is fishing for either food, social & ceremonial purposes, or for livelihood.

The Department of Fisheries and Oceans (DFO) issues special fishing licenses to First Nation communities. DFO recognizes two types of Mi'kmaw fisheries:

- Food, Social, and Ceremonial fishery (under which fish must be consumed by the individual or community, can be used for the purpose of harvesting other species of food and is not to be sold); and
- Aboriginal Communal Commercial fishery (which are Band owned and operated Commercial Fishing licenses where the regulated catch is sold for economical gain).

In addition, Mi'kmaw communities in Nova Scotia have a treaty right to fish in pursuit of a moderate livelihood. This right was determined in what is known as the Marshall decision in 1993. The case went all the way to the Supreme Court of Canada which affirmed that Marshall and other Mi'kmaw people had the right to fish, including for lobster, in the pursuit of a moderate livelihood. Mi'kmaw communities fish under those rights across the province and manage conservation practices to ensure communities can continue to benefit from lobsters for generations to come.

Sources:

1. Kwilmu'kw Maw-klusuaqn, We are Seeking Consensus. [Fisheries](#).
2. Mi'kmawey Debort Cultural Centre. [Sa'qewe'l kmitkinal - Ancestors Live Here](#).

Mi'kmaw flag



Commonly referred to as the Santée Mawióómi flag or the Míkmaq Grand Council Flag, the wapéék (white) denotes the purity of Creation, mekwéék klujjewey (red cross) represents mankind and infinity (four directions), náákúúset (sun) represents forces of the day, and tepkunaset (moon) signifies forces of the night.

Students will be able to:

- Investigate the concept of Netukulimk and its role in sustainable communities.
- Relate the concepts expressed by Netukulimk (respect, responsibility, relationship, and reciprocity) to students' lives.
- Investigate students' interconnection to the ocean and marine life.
- Investigate how marine life, such as lobsters, support the social and economic connections our communities.

Critical questions:

- How does the ocean connect to you?
- How does the Netukulimk concept connect humans and marine life such as lobsters?
- How do the concepts expressed by Netukulimk (respect, responsibility, relationship and reciprocity) connect to students lives?

Resources:

WATCH:

- [Netukulimk \(0:26\)](#)
- [Netukulimk with Clifford Paul \(4:18\)](#)
- [Ocean School- Netukulimk \(4:00\)](#)
- [Oceans 101 \(2:53\)](#)

Ask: How might Netukulimk support balance and harmony in the ocean?

WATCH:

- [Acadian Video- Lobster fisher Alfred Deveau](#)

Ask: How have different cultures fished and honoured traditions?

- [The Lobster Fishery in Southwest Nova \(2:16\)](#)
- [The science behind the colours of lobsters \(4:31\)](#)
- [Lobster Molt Caught on Camera! \(2:01\)](#)
- [Lobster Measurement: Undersized \(1:01\)](#)

READ: [Lobster Institute, Maine](#)

Ask: How do fishers catch lobster?

Activities

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about lobsters. What do they know about how lobsters are fished? Have they ever eaten one? Do they know anyone who fishes for their livelihood?

WATCH and REFLECT (WRITE/DRAW, ETC.):

Students watch the videos provided, and reflect on the critical questions through writing and drawing, etc.

STUDENT LED

1. WHY THE OCEAN MATTERS:

Students watch videos and answer questions with text, drawing, or a digital collage.

2. CONNECTIONS TO THE OCEAN:

Students create a mindmap of political, economic, and socio-cultural connections to the ocean.

3. NETUKULIMK:

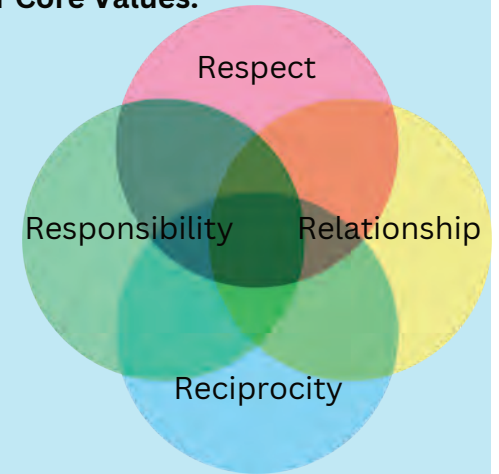
Students watch videos and answer questions with text, drawing, or a digital collage. In addition, students create a story about the oceans using the character of a lobster to discuss the concepts of Netukulimk.

4. JIGSAW INTERCONNECTION:

Students split into 4 groups and each group focuses on one circle and answers the questions, then shares with the rest of the class. Students identify interconnectedness between self, family, community, and environment.

Netukulimk weaves the Four Core Values:

- Respect
- Responsibility
- Relationship
- Reciprocity



IDENTIFY:

Invite students to identify the interconnectedness of Netukulimk values of respect, responsibility, relationship, and reciprocity. Define these terms and give examples.

Examples:

Respect- the rhythms, cycles and patterns of all living beings and nonliving things.

Relationship- the relationship one has with family extends to the plant world, the animal world, and the four elements of earth, air, water, and fire.

Reciprocity- only taking what you, your family, and/or your community may need. A good example of this is knowing how much one can harvest during times of scarcity or times of over population.

Responsibility- people were given responsibility to care for Wskitqamu (Mother Earth).

5. CULTURAL FLAGS:

Write a few sentences each to describe what the colours and symbols of each of the flags represents.

6. ALL ABOUT LOBSTERS:

Students will read and watch and fill in the answers. Correct answers are **bolded**.

Read: [Lobster Institute, Maine.](#)

Watch:

- [The Lobster Fishery in Southwest Nova Scotia \(2:16\)](#)
- [Lobster Molt Caught on Camera! \(1:01\)](#)
- [Lobster Measurement: Undersized \(1:01\)](#)

Where do lobsters live?

Lobsters live at the bottom of the **ocean**. They like the cold and **salty** waters. They also like to hide in **rocks and weeds**.

What do lobsters eat? Do they have teeth?

Lobsters like to eat **crabs, clams, mussels, starfish, other small fish and shellfish... and sometimes even other lobsters**. A lobster does have teeth – but they are not in its mouth, they are in its stomach. What are a lobster's teeth called?

The food is chewed in the stomach between by what look like three molars. These are called the “gastric mill”.

How big can a lobster get? How does it grow?

The biggest lobsters ever seen were about **3 1/2 to 4 feet long** from the tip of their claws to the end of their tails. The world record weight for a lobster is **44 pounds and 6 ounces!** Lobsters grow by molting. What does that mean? **It means when they want to grow bigger they will lose their outside shell and grow a new, bigger shell.**

Why is a lobster's shell so hard?

Lobsters do not have bones or a skeleton on the inside, like people do. Instead, they have a hard outer shell or **exoskeleton** to protect and shape them. Lobsters are also called crustaceans because they have a hard outer shell and two sets of antennae.

Who can fish for lobsters?

You have to get a special fishing license to catch lobster. You also need a boat and equipment or you can work on a boat for another captain.



How do you catch a lobster?

Lobsters are caught in **lobster traps (also called lobster pots)**. A lobster fisher will put a bag full of bait in each trap. What do they use for bait? **Bait is usually herring or other fish.**

Harvesters will then go out in the ocean in their lobster boat and drop their traps into the water, and hope that the lobster will go into the trap because they want to eat the bait. Once a lobster is in the trap it is hard for it to get out. After a day or two, the lobster fisher will pull up the traps they dropped into the water and hope to see lobsters inside.

Can you keep all the lobsters you catch? Why or why not?

No. Fishers will put female lobsters back into the ocean; and also the smaller, younger lobsters. They also put the very big lobsters back too.

What does conservation look like in the lobster fishery?

Lobster fishers must put back lobsters with eggs and smaller, younger lobster. How big does a lobster need to be to keep it? How long does it take a lobster to reach that size? **Lobsters take 7 – 9 years to reach the minimum legal size (MLS) of 82.5 mm carapace length (CL).**

What do you call a lobster with one claw? Will that lost claw grow back?

A lobster that has lost one claw or has any missing appendage is called a cull. Lobsters can grow back new claws, legs, and antennae.

7. JIGSAW NETUKULIMK VALUES:

Students split into 4 groups and each group focuses on one circle and answers the questions, then shares with the rest of the class. Students identify with values of respect, responsibility, relationship, and reciprocity. Define these terms and give examples to support learning.

8. CROSSWORD:

Students complete the crossword on lobsters. (Answers on page 19).

Thoughtbook

This lesson focused on the different ways the ocean relates to students' lives, including the connection to the health of humans and lobsters. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- How does the ocean connect to you?
- How does the Netukulimk concept connect humans and marine life such as lobsters?
- How do the concepts expressed by Netukulimk (respect, responsibility, relationship, and reciprocity) connect to students lives?



References:

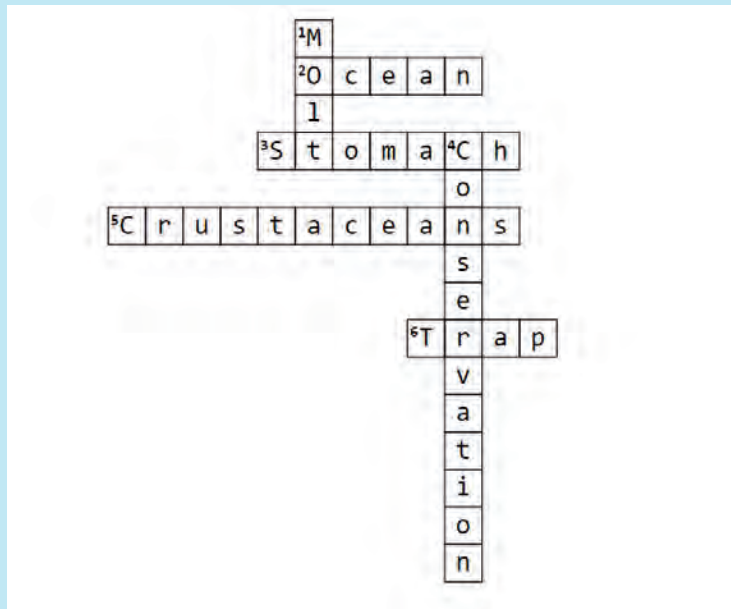
- Overview of *Homarus americanus*: The American Lobster
- A Lobsters life on the bottom
- For more information on Netukulimk, as well as Mi'kmaw culture, history and language, see the guide Mi'kmawe'l Tan Teli-kina'muemk Teaching About the Mi'kmaq (p. 153)
- Netukulimk
- Human-Sized Lobsters

Extension Activities

Watch: [Lobsters: Noble Kings of the Ocean](#) (29:33)

Invite students to read, research, and respond: How do lobsters support the Nova Scotia economy? How might that change over time?

Crossword answers:



The seafood industry generated \$1.6 billion in direct, indirect, and induced gross domestic product (GDP) for the province in 2018. The total Nova Scotia employment impact of the seafood industry was 18,000 jobs and \$865 million in wages and salaries. Nova Scotia employs more people in the seafood industry than any other Canadian province[1]. Nova Scotia is also Canada’s number one seafood exporter, exporting over \$2.3 billion of fish and seafood products throughout the world each year[2]. While the fishing industry lands numerous species, Nova Scotia’s fishing industry relies heavily on American lobster.

Lobster is harvested along the coast of Nova Scotia by thousands of independent lobster fishers using baited traps placed on the bottom of the sea. Lobster seasons vary depending on Lobster Fishing Area (LFA).

In 2021, the American lobster fishing industry was the most economically important fishery, representing 65% of Nova Scotia's total landing value[2]. Over the last few decades, lobster landings have steadily increased and Nova Scotia’s lobster fishing industry is highly lucrative due to healthy stock status and high market value.

However, Nova Scotia’s lobster population is predicted to decline due to many factors, including increased predation by unprecedented seal populations, intentional and unintentional interactions with gear, and climate change impacts[3].

Sources:

[1] [Making Waves: The Economic Contribution of the Seafood Industry to Nova Scotia](#), 2022.

[2] DFO. [Canada's Fish and Seafood Trade in 2021](#), 2022.

[3] A climate change vulnerability assessment of Nova Scotia’s lobster fishing industry (soon to be published on www.cmar.ca)



Lesson 2

Sustainable Practices: Marine and Lobster Stewardship



Background

Marine ecosystems are aquatic environments with high levels of dissolved salt. These include the open ocean, the deep-sea ocean, and coastal marine ecosystems, each of which has different physical and biological characteristics. The ocean that surrounds Nova Scotia includes many marine ecosystems that support plant and marine life. These marine ecosystem provides Nova Scotians with food as well as economic opportunities, such as tourism. Maintaining healthy marine environments ensures communities in Nova Scotia continue to benefit from the ocean.

By exploring marine life, such as lobsters, we can see how marine ecosystems have supported and continue to support and sustain our communities. Inshore lobster fishing can be traced back to pre-colonial times when it was an important food source for the Mi'kmaq. They harvested lobster (jakej) through the spring and fall using traps and spears.

The careful management of marine ecosystems guided by the Department of Fisheries and Oceans (DFO), requires the use of sustainable practices to ensure the resources we take from the environment will continue on for future generations. Mi'kmaw, Gaels, African Nova Scotian, and Acadian communities all have long histories in harvesting and managing lobsters off the shores of Nova Scotia.

Current marine management practices help to regulate industries which make use of marine ecosystems and help to sustain the environment. A number of measures address conservation in the fishery. A few examples include:

- Lobster fishers must have a license that allows them to fish in a particular Lobster Fishing Area (LFA).
- LFAs are in place to regulate licenses and number of lobster traps to ensure the sustainability of the industry and to protect the environment.
- The timing of lobster fishing seasons varies across different lobster fishing areas in order to minimize negative impacts during important life stages. These stages include egg hatching, lobster molting, egg laying, and mating. In most areas, seasons are set to avoid harvesting during these important periods.
- Escape mechanisms in traps that enable undersized lobsters to exit traps.
- Rules governing the size, design, and type of trap.
- Maintaining catch logbooks and scientific field notebooks.

Sources:

DFO. 2021. [Fishing Seasons for Inshore Lobster Fisheries.](#)

DFO. 2023. [Lobster Fishing Areas 27-38: Integrated Fisheries Management](#)

DFO. 2021. [Integrated Fisheries Management Plan](#)



Students will be able to:

- Investigate issues of marine ecosystem protection, food security, and the lobster industry.
- Investigate lobster harvesting practices and their sustainability.
- Analyze how Netukulimk can support responsible behaviour, sustainability, and care for the environment.
- Investigate the location of Mi'kmaw, Acadian, Gaelic, and African Nova Scotian communities in NS in relation to lobster fishing areas.

Critical questions:

- What does sustainability mean to you?
- What are some of the environmental, economic, and social factors that affect our oceans?
- What is the location of Mi'kmaw, Acadian, and African Nova Scotian communities in Nova Scotia in relation to lobster fishing areas?
- What is Etuaptmumk (Two-Eyed Seeing)?

Resources:

Watch:

- Elders' Stories: Two-eyed Seeing (4:51)
- Etuaptmumk: Two-Eyed Seeing | Rebecca Thomas (14:22)
- Netukulimk Mi'kmaq Sustainability Mi'kmaq History Month (7:09)

Ask: What does Two-eyed seeing mean to you?

Watch:

- What is an ecosystem | Ecosystem video for kids | Ecosystem Types (3:06)
- Nature Talks: The Diversity of Marine Ecosystems in Nova Scotia (59:10)
- Atlantic Canada Lobster (5:04)
- Sustainable Fishing (14:45)
- 100 Wild Islands: A grassroots story of conservation (9:15)
- Why the Ocean Matters (2:40)
- How to Care for the Ocean (6:34)
- Up close and personal with mysteries of the Atlantic Ocean's ecosystem (5:05)
- Marine Ecosystem (6:04)

Ask: How sustainable are lobster harvesting practices? What does sustainability of marine ecosystems include?

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about sustainability. What do they know about some of the environmental, economic, and social factors that affect our oceans? Where are lobsters harvested? By whom? How might a Two-eyed seeing approach to harvesting impact sustainability?

WATCH and REFLECT (WRITE/DRAW, ETC.):

Students watch the videos provided, and reflect on the critical questions through writing and drawing, etc.

STUDENT LED

1. MARINE ECOSYSTEMS:

Students watch videos and identify at least 3 unique things about the Atlantic ocean ecosystem with text and drawing.

2. TWO-EYED SEEING:

Students watch the videos and write a short paragraph or poem, and create a collage, drawing, or short skit to present to the class about what Two-eyed seeing means to them / the group.

3. HOW DOES LOBSTER FISHING WORK?

Students [read this story](#) and [watch this video](#) to answer the following questions:

- What is Setting day (also called Dumping day)? Where are Lobster Fishing Areas (LFAs)?
- How are traps set? Why are lobsters attracted to traps?
- How are lobsters sorted? How is the price for lobsters set?

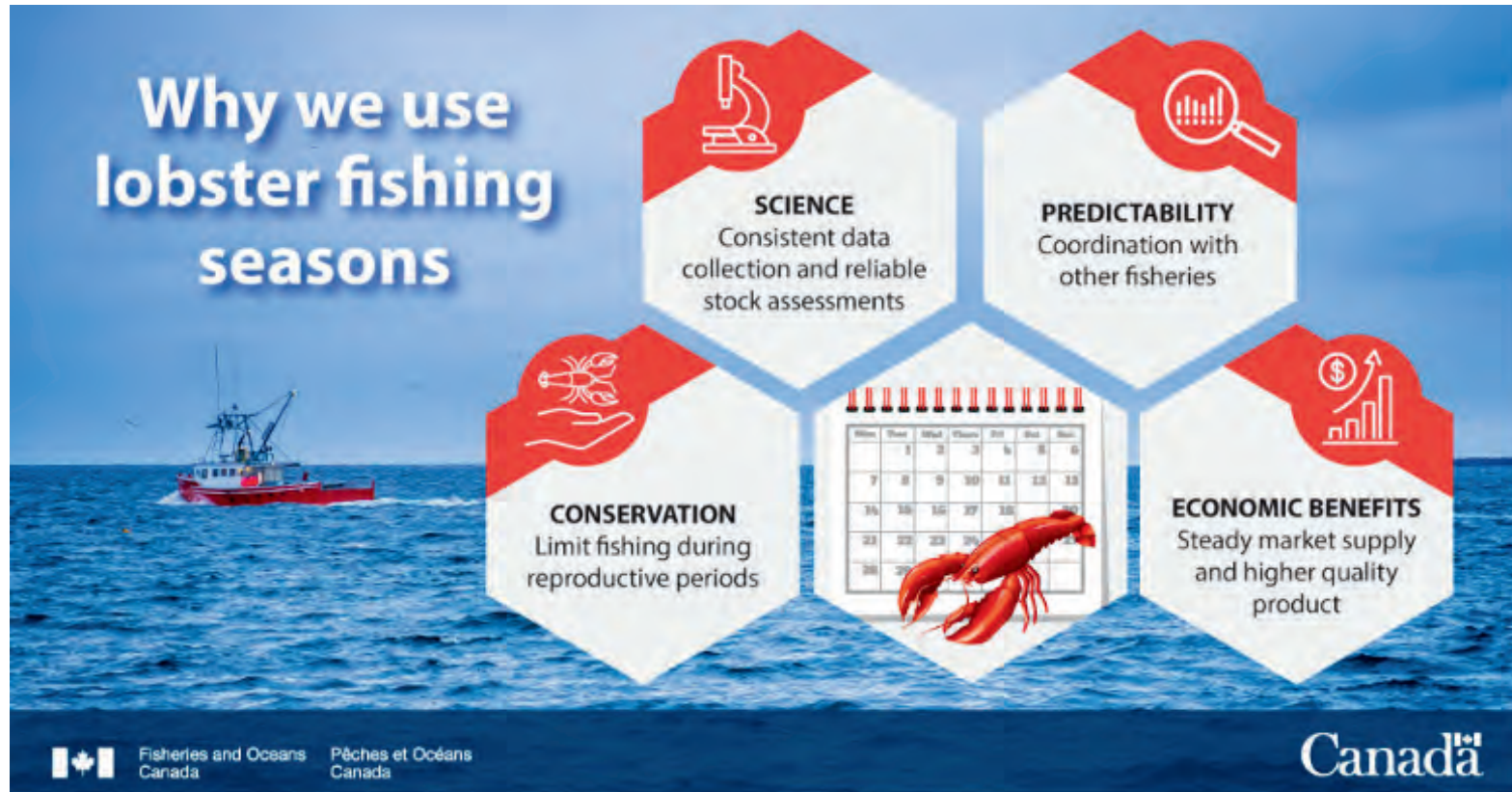
4. SUSTAINABLE FISHING

Students watch videos and answer the questions in the student guide. Invite students to brainstorm and share stories about sustainability. What do they know about some of the environmental, economic, and social factors that affect our oceans? Where are lobsters harvested? By whom? How might a Two-eyed seeing approach to harvesting impact sustainability?

5. LOBSTER FISHING SEASONS:

Students review the infographic and answer the question: How do lobster fishing seasons contribute to sustainability?

Source: DFO- Lobster Fishing Seasons Infographic



Why we use lobster fishing seasons:

- Science – consistent data collection and reliable stock assessments
- Predictability – coordination with other fisheries
- Conservation – limit fishing during reproductive periods
- Economic benefits – steady market supply and higher quality product

Activities

6. BE YOUR OWN CAPTAIN:

Students use the maps below to answer the questions in the student guide.

- [NS Lobster Fishing Areas](#) (Figure 2), and [North Shore Fishing Areas](#)
- [NS Mi'kmaq Communities Map](#)
- [Historic and present day Acadie in NS Map](#) (p.13)
- [African Nova Scotian Communities Map](#)



Students are fishing captains who will harvest lobster for sale in their community. They have a fishing license for their LFA. Based on the information from the maps and charts – students create a presentation in Google slides (minimum 5 slides) with the following information: **(Answers are bolded below)**

- Name your boat: Find a picture of a fishing boat and give your fishing boat a name.
- Using the LFA map, locate the LFA closest to your community. **Answers will differ depending upon location of the school**
- Identify other Mi'kmaq, Acadian, Gaelic, and African Nova Scotian communities near to you.
- Determine the number of traps you will need - Based on the chart - what is the maximum number of traps allowed in your LFA? **250**
- When can you fish: Based on the chart (in the student workbook) – determine your fishing season. **April 19 - June 20 (season is different for each LFA)**
- How much profit will you make: Calculate what profit you would make if:
 - The average trap can hold 5-6 lobsters. **(5.5 lobsters x 250 traps x)= 1375 lobster**
 - Each lobster weighs an average of 1.5 pounds. **1375 lobster x 1.5lbs= 2062.5 lbs of lobster**
 - Lobster traps are typically checked 2.5 times each week. **2.5 x/week for 1 week= 2062.5 x 2.5 times= 5156.25 lbs of lobster**
 - Research the latest price per pound and calculate how much you would make during a 1 week period. **Assuming \$10/lb, net profit would be \$51,562.50 in one week. Remember the fishing season is only 9 weeks long.**
 - Students will estimate operational costs including labour, fuel, bait, and boat maintenance, etc. **Approx. \$5-10,000/week**
- Sustainable practices: What are some sustainable lobster harvesting practices you would use as captain of your boat?
Examples: Return females and under / oversized lobsters, notch the females, and use ropeless traps.

Thoughtbook

This lesson focused on marine ecosystems and sustainable practices. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- What does sustainability mean to you?
- What are some of the environmental, economic, and social factors that affect our oceans?
- What is the location of Mi'kmaw, Acadian, and African Nova Scotian communities in Nova Scotia in relation to lobster fishing areas?
- What is Etuaptmumk (Two-Eyed Seeing)?



References:

- Ecosystems, National Geographic
- Marine Ecosystems, National Geographic

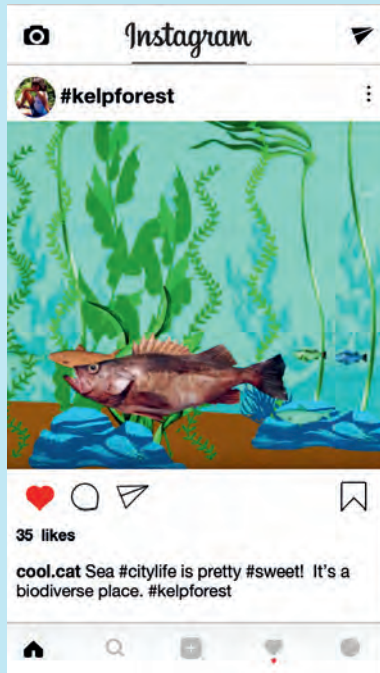
Extension Activities

CREATE AN INSTAGRAM POST!

360 Virtual Reality Experience on a Canadian Lobster Fishing Boat (3:14)

Take a screenshot of the Virtual Reality Experience video and create an Instagram post using the template in the student guide.

Include captions that will help you explain the screenshot.



Adapted from: [Ocean School off-the-hook habitats](#)

TEST YOUR KNOWLEDGE WITH KAHOOT!

Invite students to test their knowledge of the ocean with this fun Kahoot.

Invite students to test their knowledge of the Atlantic Ocean with this fun Kahoot.

KAHOOT!

Learning isn't just about memorization and taking tests. Sometimes it involves play. Yes, learning can be fun, too. That's where Kahoot! comes in. These online interactive games help learners consolidate their lessons and process what they've learned. Explore the Kahoot! collection curated by the National Geographic Resource Library.

GRADES

5 - 12

SUBJECTS

Biology, Conservation, Earth Science, Geography, Social Studies, Ancient Civilizations

GHOST GEAR AND MARINE DEBRIS:

- [Fighting for Trash Free Seas](#)
- [Ghost Gear Plaguing Ocean Wildlife](#)
- [A Win for Lobstermen and Right Whales \(1:51\)](#)

Ask: What is ghost gear? What happens to ghost gear left in the ocean? Who can it impact marine life and damage habitats?

Lesson 3

Climate Change: Environmental and Cultural Impacts



Background

For the past hundred or more years, human activities have caused the climate to change. The release of what are known as greenhouse gases, which include carbon dioxide that comes from burning fossil fuels, has caused the Earth to become warmer. Greenhouse gases act like a greenhouse or a layer of insulation for the Earth: they trap heat and warm the planet. Why are carbon dioxide concentrations on the rise? Human-caused activities (combustion of fossil fuels, agricultural practices, land use changes etc.). Climate change, by changing global human habitat, will cause profound impacts on water, resources, and the communities that rely on them.

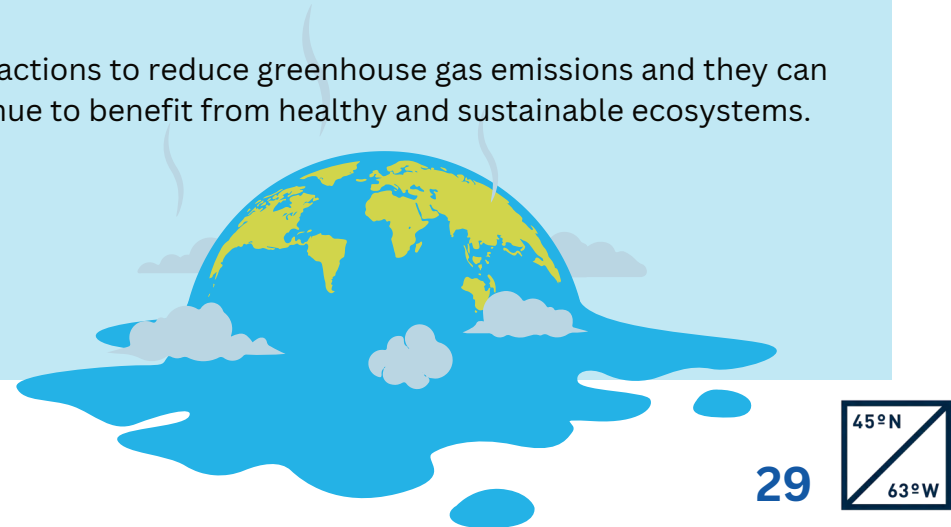
It is not just the air that is getting warmer, but the oceans are too.

The increase temperature in the oceans has caused them to become more acidic and less oxygenated which affects the health of marine ecosystems. For instance, climate change is a particular concern to the lobster fishery in Nova Scotia. While warmer temperatures in the oceans have increased the presence of lobsters in Nova Scotia as they have moved here from warmer waters in the South, lobster habitats may start to decline over the next few decades if the warming continues unchecked. Warming waters can affect lobsters in a number of ways including softer shells, smaller size, and increased possibility of disease. The frequency and intensity of storms is also likely to increase which will make it harder and more dangerous for fishers to go out on the water.

Ocean warming is also negatively impacting fish species traditionally used as bait by the lobster fishing industry. Overexploitation and migration of Atlantic herring and Atlantic mackerel bait fisheries has resulted in fishers paying more for bait or having to find alternatives.

Communities can reduce the impact of climate change by taking actions to reduce greenhouse gas emissions and they can adapt to the changing climate to ensure people are able to continue to benefit from healthy and sustainable ecosystems.

Source: [Managing Fisheries in an Age of Climate Change](#)



Students will be able to:

- Investigate how climate change impacts coastal communities and how communities are adapting to a changing environment.
- Identify the challenges climate change poses to ecosystems and the lobster industry.
- Analyze ways that the lobster fishery supports sustainable development in local communities.

Critical questions:

- How does climate change impact coastal communities?
- How are coastal communities adapting to a changing environment?
- What is the link between climate change and food?
- How does the lobster fishery support sustainable development in local communities?

Resources:

Watch:

- [Climate Change 101 with Bill Nye | National Geographic \(4:09\)](#)
- [Climate Change for kids \(11:34\)](#)
- [Aquatic Climate Change \(6:22\)](#)
- [Transforming Climate Action \(10:30\)](#)
- [Adapting to sea level rise \(7:57\)](#)
- [Land and Sea: Food Security \(22:00\)](#)

Read:

[Warming pushes lobsters and other species to seek cooler homes](#)

Ask:

- What is the link between climate change and economic and food?
- How does climate change impact coastal communities?
- How are coastal communities adapting to a changing environment?

Activities

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about climate change. What do they know about climate change? Have they noticed any changes in weather? Do they hear about climate change on the news, or from their families? How do they think climate change will affect marine animals like lobsters?

Lobsters can remain happy and healthy in waters up to 20°C (68°F). When oceans get warmer than this, it affects the way lobsters breathe, and can affect how they fight off diseases and even make their shells weaker. Lobsters adapt to warmer ocean temperatures by moving further north. While there may be more lobsters in Nova Scotia now that have moved north from Maine and further south, eventually, they may go further north, and leave Nova Scotia's shores.

WATCH and REFLECT (WRITE/DRAW, ETC.):

Students watch the videos provided, and reflect on the critical questions through writing and drawing, etc.

STUDENT LED

1. CLIMATE CHANGE:

Students watch and read and answer the questions in the student guide.

2. ADAPTING TO CLIMATE CHANGE:

Students watch the videos and answer the questions in the student guide.

WATCH and READ:

[The Lobster Trap](#)

Questions and responses on the next page.



Activities

What are three ways climate change is impacting the ocean?

- Increasing water temperatures.
- Increasing acidification, which can weaken lobster shells.
- Decreasing oxygen levels.

What influences Nova Scotia's water temperatures?

- The deep water off Nova Scotia is influenced by the cooler, fresher Labrador Current water from the north and the warmer, saltier waters of the Gulf Stream from the south.
- Increasing water temperatures due to climate change.

What happens to lobsters when water temperatures rise?

- Lobster prefer water at about 10 to 16 degrees.
- Once water temperatures rise to around 19 or 20 degrees lobster will likely move, says Cook. If the water warms faster than lobsters can scurry away, they can suffer physiological stress sufficient to kill them or suppress their immune systems.
- Heatwaves destroy seagrass and kelp forests, which are used as lobster habitat
- Warming temperatures can change when molting happens, leading to more weak, soft-shelled lobster when fishing begins in November.

How can the lobster industry adapt to climate change?

- Shifting to offering boat tours to tourists.
- Improving lobster assessments and management plans for each lobster fishing area (LFA).
- Diversifying the species harvested with fluctuations in stocks.
- Identifying early warning signs.



3. COMMUNITY ACTION ON CLIMATE CHANGE:

Step 1: Divide the class into 6 different groups. Each group is responsible for responding to the impacts of climate change on the oceans. As a group, discuss and dialogue what your group can do to reduce greenhouse gas emissions, mitigate and adapt to climate change.

Groups:

Lobster Fishers: considerations your group may want to think about include technology, lobster seasons, location for fishing, etc.

Provincial Government: you are responsible for the management, promotion, support and development of the fishing, aquaculture and seafood processing industries.

Citizens group: you are a group of concerned citizens who care about the environment and want to reduce greenhouse gas emissions.

Local Chamber of Commerce: you are a group of local businesses who rely on the oceans and tourism to keep your business going (e.g. hotels).

Scientists: you are a group of scientists who are looking to determine the best ways to respond to reducing greenhouse gas emissions and mitigating and adapting to climate change. What research do you need to do to manage the number of traps, legal size of lobster, etc.

Federal Government: you are responsible for managing lobster stocks, permitting harvesting licenses, etc.

Step 2: Present your ideas to the local community forum. Each group will have 10 minutes to present their ideas (in PowerPoint or presentation, poster or through song and dance). Get creative.

Step 3: Vote on the 3 best ideas that your community can undertake to respond to climate change.

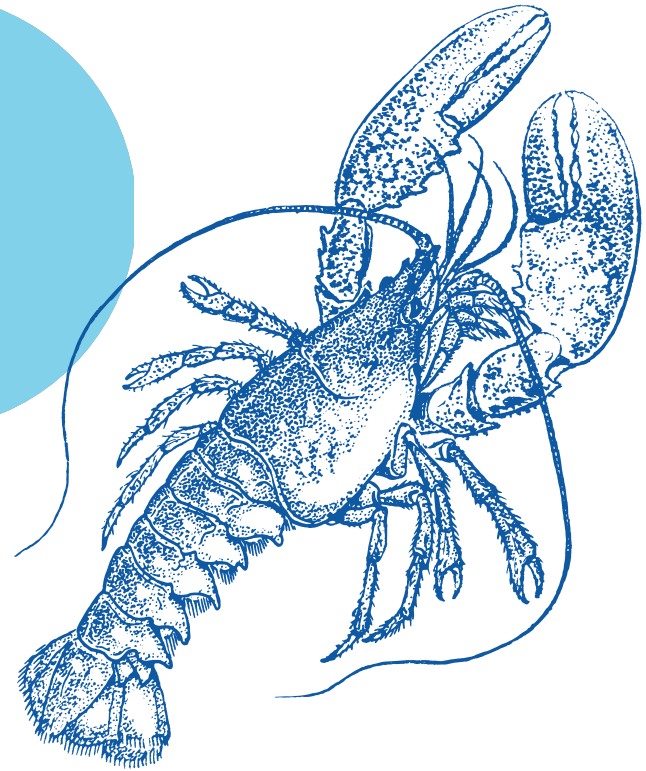


Thoughtbook

This lesson focused on climate change, the impact coastal communities, and how coastal communities are adapting to a changing environment. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- How does climate change impact coastal communities?
- How are coastal communities adapting to a changing environment?
- How does the lobster fishery support sustainable development in local communities?



Extension Activities

MITIGATING CLIMATE CHANGE IMPACTS IN THE LOBSTER INDUSTRY:

Reducing and phasing out emissions from Nova Scotia's own lobster fishery is one way to mitigate the effects of climate change. Some ways to reduce emissions include efficient trip planning and utilizing an alternate fuel supply. The videos below show different approaches to mitigate the effects of climate change.

Watch one or both:

[A Lobster Community Adapts through Participatory Planning \(3:34\)](#)

[How feeding cows seaweed could cut methane emissions \(5:51\)](#)

Small group or large group class discussion:

How are communities and industries adapting to climate change?



Extension Activities

Main greenhouse gases:



Nitrous Oxide



Water vapour



KNOW YOUR GREENHOUSE GASES:

Greenhouse gases are gases in the Earth's atmosphere which trap heat. An increase in greenhouse gases caused by human activity is responsible for the greenhouse effect and global warming.

Meet the greenhouse gases: Download [greenhouse gas cards](#).

Water vapour: Produced through the evaporation or boiling of water or through melting ice.

Carbon dioxide: Produced through burning coal, oil, or natural gas.

Methane: Produced through production and transport of coal, natural gas, and oil, also from livestock and other agricultural practices, land use, and by the decay of organic waste in landfills.

Ozone: Produced through chemical reactions between pollutants emitted from vehicles, factories, and other industrial sources, fossil fuels, combustion, consumer products, and evaporation of paints.

Nitrous Oxide: Produced through human and animal waste.

Chlorofluorocarbons: Produced through refrigerant leaks and use of aerosols.

Materials: Toothpicks, gummy sweets or plasticine (lots of different colours).

Steps:

1. Share the greenhouse gas cards with students and explain that each greenhouse gas is made up of a group of atoms that represent elements that make up that atom.

2. Assign a colour to each of the following atoms and build greenhouse gas models with clay or candy.

C – Carbon H – Hydrogen Cl- Chlorine O – Oxygen F – Fluorine

REDUCING EMISSIONS TO REDUCE THE GLOBAL TEMPERATURES:

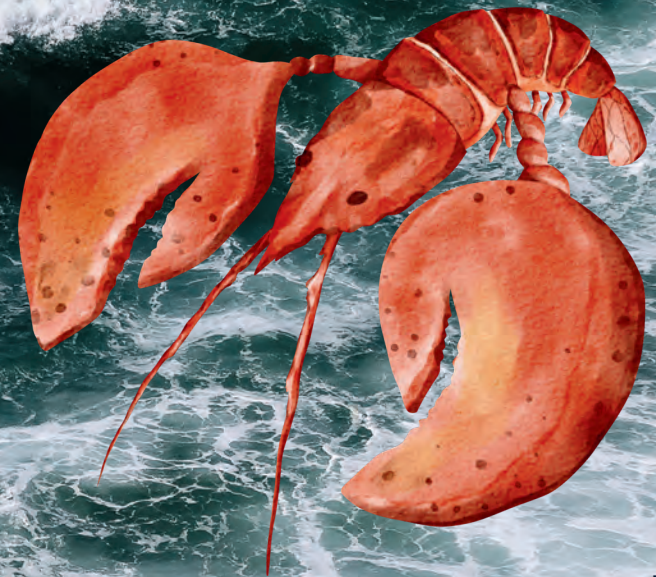
Watch: [Which countries have emitted the most CO2? \(1:39\)](#)

See how changes and actions can lead to different emissions which will effect temperature increases and reductions - you can check out this simulation model.

Ask: What do you think can be done to reduce greenhouse gas emissions in our school and in our communities?

Lesson 4

Livelihoods: Jobs, Culture, and Food



Students will be able to:

- Describe the importance of the lobster industry to the Nova Scotian economy.
- Identify key careers and opportunities in the fishing and marine industry.
- Identify key careers and opportunities specific to the lobster industry.

Critical questions:

- What jobs in Nova Scotia involve the ocean?
- How do Nova Scotians make a living from the ocean?
- What are the unique opportunities in the lobster industry?

Resources:

Watch:

Lobster fishing:

- 360 Virtual Reality Experience on a Canadian Lobster Fishing Boat (3:13)
- All female lobster crew (1:58)

Processing and sales:

- Pierce Industries (1:19)
- Riverside Industries (1:11)
- Gidney Industries (1:44)
- Lobster Processing Explained (1:41)
- Fisherman Premium Atlantic Lobster (2:28)

Science and Research:

- Meet Mark Frederich [Marine Biologist] (2:53)

Food and Restaurants:

- Places to grab lobster on the South Shore (5:23)
- Harvesters Gathering (7:09)

Tourism:

- Lobster fishing tours (3:16)
- Bay of Fundy Lobster Tours (4:03)

Background

The fishing industry is vital to Nova Scotia's economy. Over 18,000 people work directly in fishing, aquaculture, and logistics (transportation, distribution, and processing), with many more involved in support services such as research, equipment, sales and tourism. There are more people working in the seafood industry in Nova Scotia than in any other province in Canada. Nova Scotia also exports more than \$2.3 billion of fish and seafood products throughout the world each year. (Nova Scotia Business Inc, 2022)[1]. Lobster landings have been experiencing an upward trend, and remain at one of the highest levels recorded this century. Nova Scotia landings have more than doubled over the past 20 years.

Lobsters are the most important seafood harvested from the ocean off the coast of Nova Scotia. Lobsters are caught, processed, and packaged here in Nova Scotia and exported to markets in the United States, Europe, and Asia. The Nova Scotian economy relies on revenue from the lobster industry. It is one of the most important products produced in this region. Lobster is served at restaurants, celebrated in feasts, and can be showcased in arts and culture throughout the entire province. Every region of the province is involved in or impacted by the lobster industry. The Municipality of Barrington is even known as the Lobster Capital of Canada.

There are many jobs and opportunities to develop a career in the lobster industry. There are jobs in fishing, processing as well as in science, research, sales, and equipment supplies. In addition, there are jobs in cultural industries such as restaurants that serve lobster, and artists and craft makers who produce art and products celebrating and honouring lobsters.

The majority (78%) of Canadian lobster exports are destined for the United States. Other key markets include Asia (Japan and China) and the European Union (Belgium and France). Lobster is also exported to an additional 50 countries[2].



[1] A climate change vulnerability assessment of Nova Scotia's lobster fishing industry (soon to be published on www.cmar.ca)

[2] DFO. 2015. [Lobster](#).

TEACHER LED

INQUIRE:

Invite students to brainstorm and share stories about jobs on the ocean and in the lobster fishing industry. What kinds of jobs might include science, technology, cooking, arts and culture, and tourism?

WATCH and REFLECT (WRITE/DRAW, ETC.):

Students watch the videos provided, and reflect on the critical questions through writing and drawing, etc.

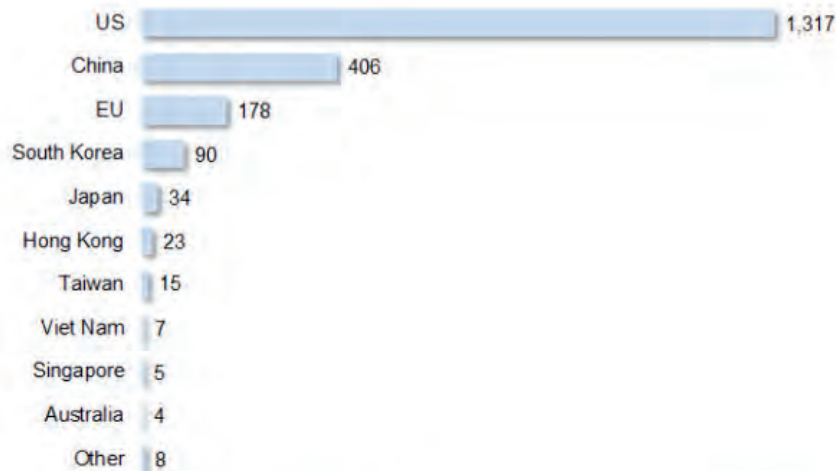
STUDENT LED

1. LOBSTER FISHING

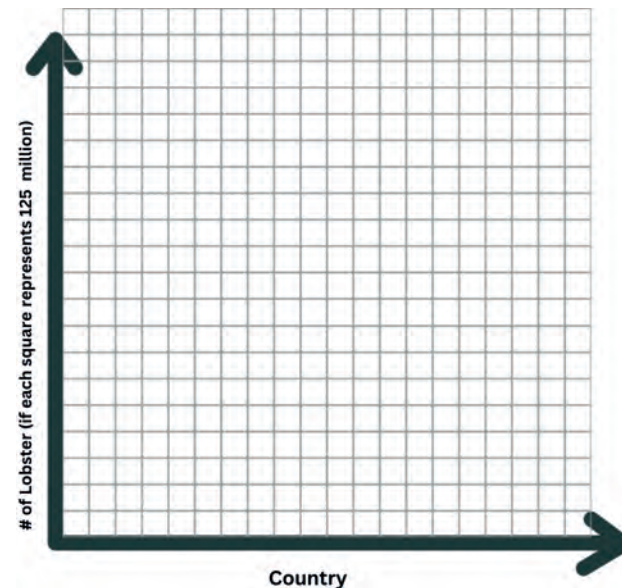
Students watch the videos and answer the questions in the student guide.

2. GRAPH: WHERE ARE LOBSTERS SOLD?

Students to use the information provided to create a graph showing the 10 ten countries that buy Canadian lobster. The student guidebook includes a graph template. [Source info from DFO.](#)



Source: Fisheries and Oceans Canada (2021), EXIM (database), Ottawa. Accessed September 28, 2021.



3. JOBS CONNECTED TO THE OCEAN: Google Slideshow

Beyond fishing, there are many ways to have a job connected to the ocean. [Review this Google slideshow that includes videos and descriptions of jobs connected to the ocean.](#) These jobs include fishing, aquaculture, seafood processing, as well as support services such as research, equipment, sales, and tourism.

Students will follow the steps:

Step 1: Select a livelihood that would be of most interest to them.

Step 2: Watch a video from the resources list that illustrates the career they have chosen.

Step 3: Consider what skills and [education](#) they would need to perform the job they selected.

Step 4: Write a job ad for the career they are interested in, including 3 skills required for the job.

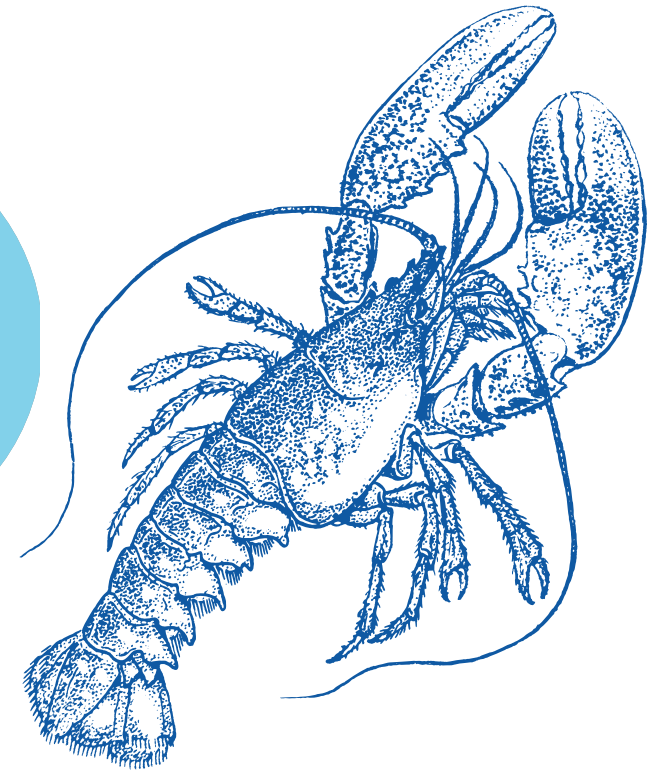


Thoughtbook

This lesson focused on the unique livelihoods and career opportunities in the lobster industry in Nova Scotia. Students will take time to journal their thoughts and things they have learned. They can draw a picture, a comic, or write a poem.

Reflect:

- What jobs in Nova Scotia involve the ocean?
- How do Nova Scotians make a living from the ocean?
- What are the unique opportunities in the lobster industry?



Extension Activities

In 2021, Nova Scotia's Clearwater Seafood was acquired by a partnership between Premium Brands and the Mi'kmaq Coalition, comprised of seven Mi'kmaq communities in Nova Scotia and Newfoundland. Today, Clearwater is proudly Indigenous-owned, committed to creating a sustainable seafood future for generations to come.

The Mi'kmaq Coalition was formed by Membertou, Miawpukek, Paqtnekek, Pictou Landing, Potlotek, Sipekne'katik, and We'koqma'q. The sale represents the single largest investment in the seafood industry by any Indigenous group in Canada.

Chief Terry Paul, of Membertou First Nation in Nova Scotia, who led the Mi'kmaq coalition, described it as a “transformational opportunity for the Mi'kmaq to become significant participants in the commercial fishery,” and praised Clearwater’s management expertise, infrastructure and global presence”[1].

Read this to students, identify any words they don't know. Invite them to investigate news stories and answer the following questions:

- 1) Why did this sale make national news in 2021?
- 2) Why is this sale important for Mi'kmaq communities?

Ask students to do some research to answer:

- 3) What has been the impact of the sale?

[1] "Reconciliation in Canada." The Clearwater deal marks Indigenous nations' growing clout



Do you want more ocean related classroom activities?

This Educational Resources Library has a list of ocean resources.

[World Oceans Day for schools](#) has a searchable database of activities by grade level.

[Smithsonian Ocean Educator's Corner](#) has a searchable database of activities by grade level.

[Sailors for the Sea](#) has many hands-on activities searchable by age level.



Extension Activities

The Acadian company, Comeau's Seafood has seen many successes. They have grown and diversified their portfolio continually over the last 25 years. 1946 marked the beginning of Comeau's Sea Foods. Strong-willed and determined to make his mark in the small fishing region of la Baie Sainte-Marie, Nova Scotia, Bernardin Comeau worked tirelessly to create a footprint that has served as the foundation for what Comeau's Sea Foods is today.

Together with his son, Marcel R. Comeau, they sought out new markets, developed new products, and surrounded themselves with hard-working people from Acadian communities throughout South-West Nova Scotia.

Watch:

[Celebrating 75 Years- Comeau's Seafood \(2:20\)](#)

Watch the video and invite students to discuss the following questions:

1) How many jobs do you think are created by all of the parts of Comeau's Seafood? (Answer: Over 400 jobs).

- Shipping and cold storage
- Herring fleet and processing
- Machine and manufacturing
- Welding and fabrication
- Ship repair and maintenance

2) What is the connection to all of these jobs to the lobster industry? Herring is lobster bait, machining, fabrication, and ship repair are all required for fishing and transportation. Cold storage is required to keep lobster fresh before processing and shipping.

